

U.S.-Russia Highly Enriched Uranium(HEU) Purchase Agreement Update

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HEU Transparency Program



The HEU Purchase Agreement

1993 HEU Purchase Agreement

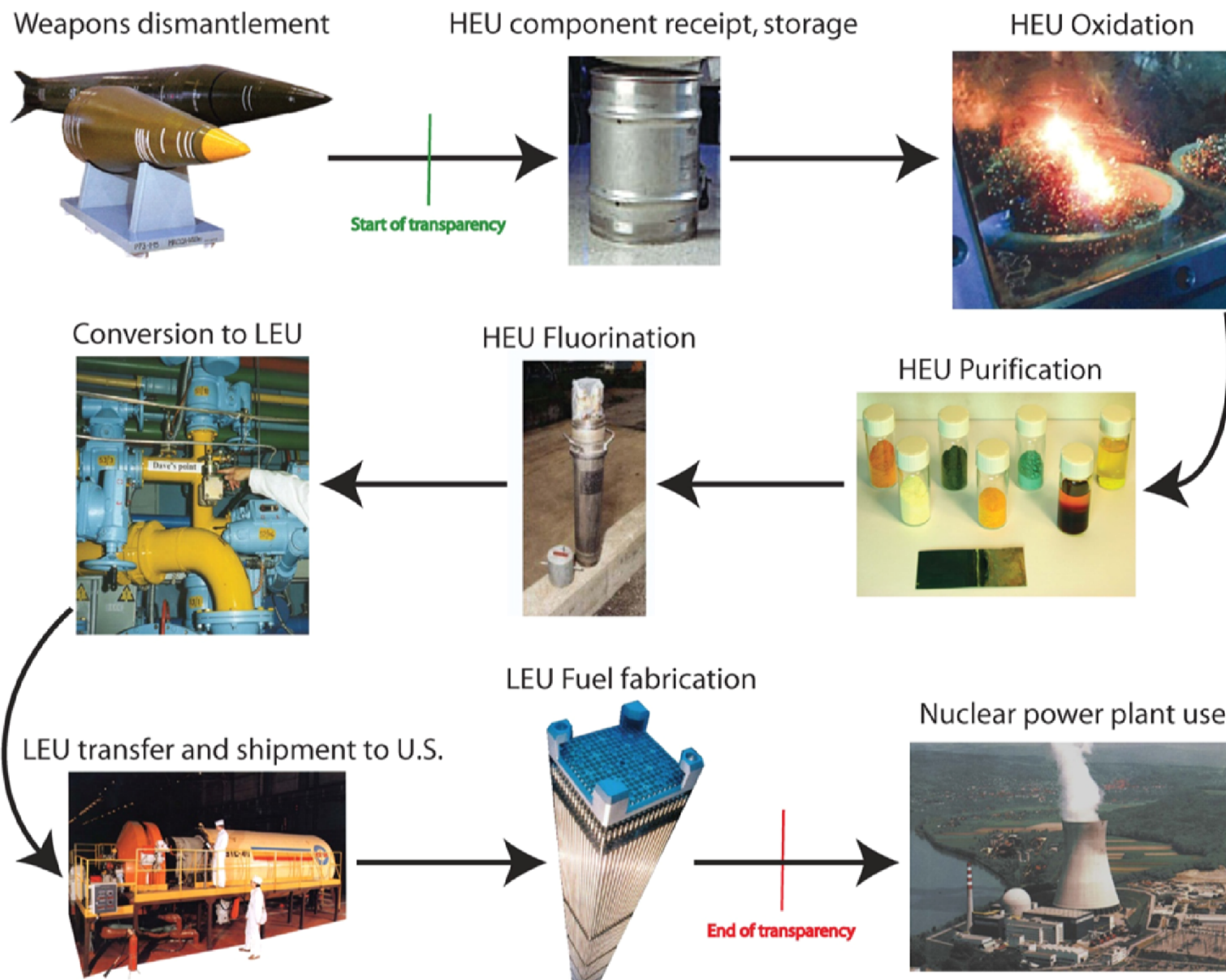
- United States purchased low enriched uranium (LEU) derived from 500 metric tons (MT) Russian weapons-origin HEU
- Commercial implementation by two Executive Agents
 - U.S. Executive Agent was the United States Enrichment Corporation (USEC)
 - Russian Executive Agent was Techsnabexport (Tenex)
- USEC and Tenex specified annual delivery terms for LEU containing 30 MT 90% HEU
 - USEC received LEU in St. Petersburg
 - USEC paid Tenex for SWU component of LEU
 - USEC transferred title of an equivalent amount of natural uranium to Tenex

Mutual Benefits

- 500 MT of 90% HEU converted into LEU is equal to approximately 20,000 nuclear warheads permanently eliminated
- Russian weapons-derived LEU provides nearly half of all U.S. nuclear fuel and has generated approximately 10% of U.S. electricity consumed over the past fifteen years
- Stable employment for Russian and American HEU scientists, engineers, and technicians
- Stable, predictable Russian access to U.S. SWU and uranium markets



Material Processing



Material Flow: Russia

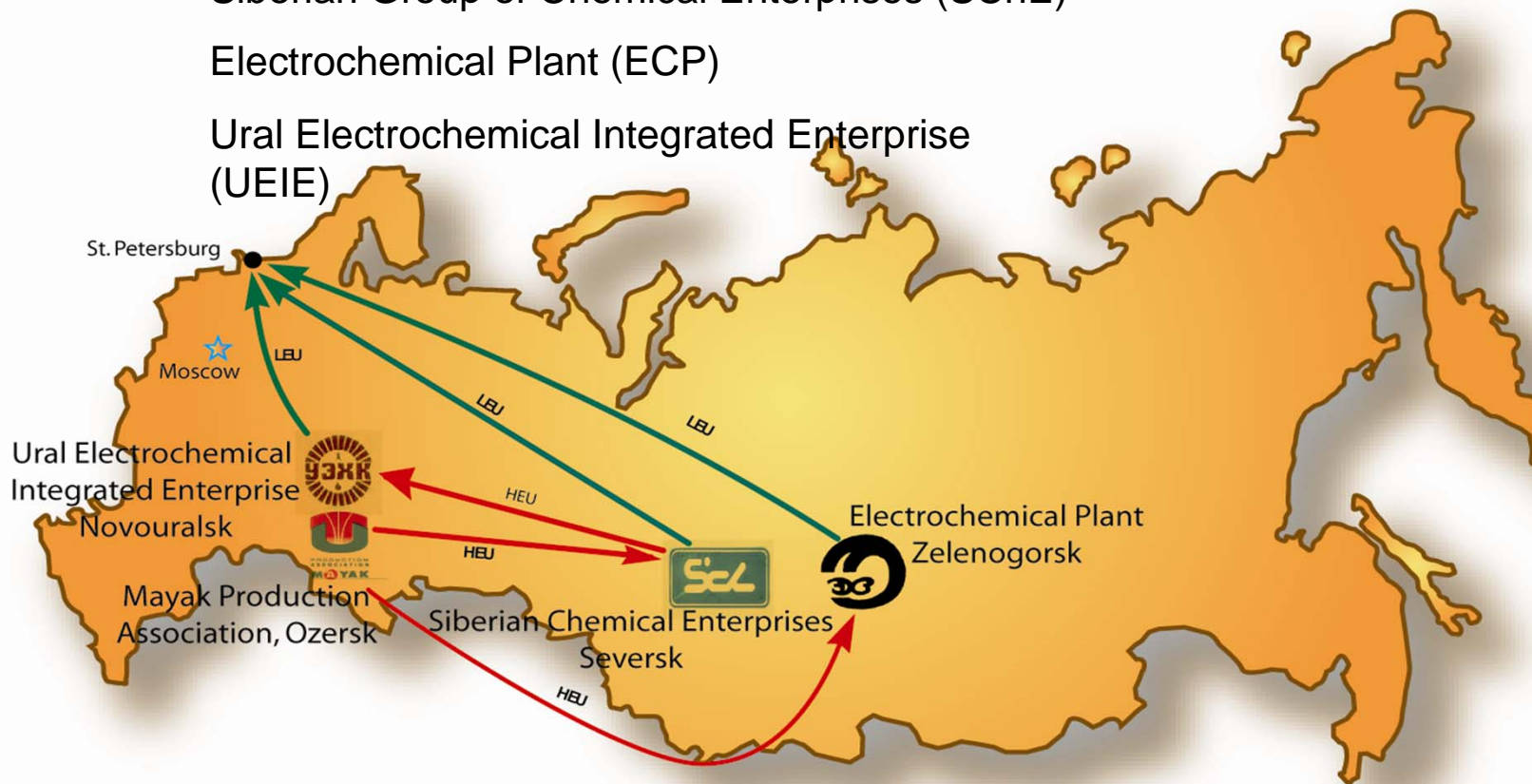
Russia processed HEU at four sites:

Mayak Production Association (MPA)

Siberian Group of Chemical Enterprises (SChE)

Electrochemical Plant (ECP)

Ural Electrochemical Integrated Enterprise (UEIE)



Material Flow: United States

**USEC received
weapons-origin
LEU from Russia:**

USEC Paducah

USEC Portsmouth



**The LEU was fabricated into
nuclear fuel at five sites:**

Westinghouse

Global Nuclear Fuel

AREVA-Richland

AREVA-Lynchburg

ABB/Combustion Engineering

The Transparency Mandate

- “The parties shall establish transparency measures to ensure the objectives of this Agreement are met. . .” (1993 Agreement)
- “Transparency and access measures to guarantee that...”: (1993 Memorandum of Understanding)
 - HEU is extracted from nuclear weapons
 - The same HEU is oxidized
 - The HEU is blended down to LEU
 - The LEU delivered to the United States is fabricated into fuel for commercial reactors
- 18 Annexes specify monitoring access and activity rights in each U.S. and Russian facility subject to the Agreement (1994 Protocol)

Implementing Transparency

- U.S. monitoring in Russia
 - Up to six annual U.S. visits to each of the four Russian HEU-LEU processing facilities
 - U.S. monitoring office at Ural Electrochemical Integrated Enterprise (closed in 2012)
- Russian monitoring in the U.S.
 - Up to six annual visits to the Gaseous Diffusion Plants
 - Up to two annual visits to each U.S. fuel fabricator
 - Russia briefly maintained a monitoring office in Portsmouth, Ohio



U.S. Monitoring Objectives

Monitoring Objectives

- Ensure consistency among Russian documentation, U.S. expert observations, and measurements from U.S.-designed instruments
- Develop overall confidence that Russian weapons-origin HEU is converted to LEU under the Agreement



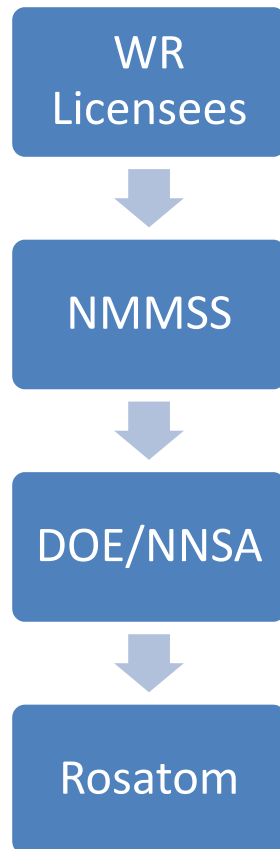
Monitoring Tools

- **Document Exchanges** of Russian shipping, sampling, and process activities
- **Observations** of significant process steps
- **Measurements** on uranium at key processing points



Document Exchanges

- The United States and Russia exchange documentation of all material shipped and processed under the Agreement



Observations

- Experts observe plant operations and major material transformations firsthand



Measurements

- U.S. non-destructive assay equipment confirmed presence of 90% enriched HEU in sealed containers
- Measured HEU metal, oxide, and hexafluoride in storage and in process

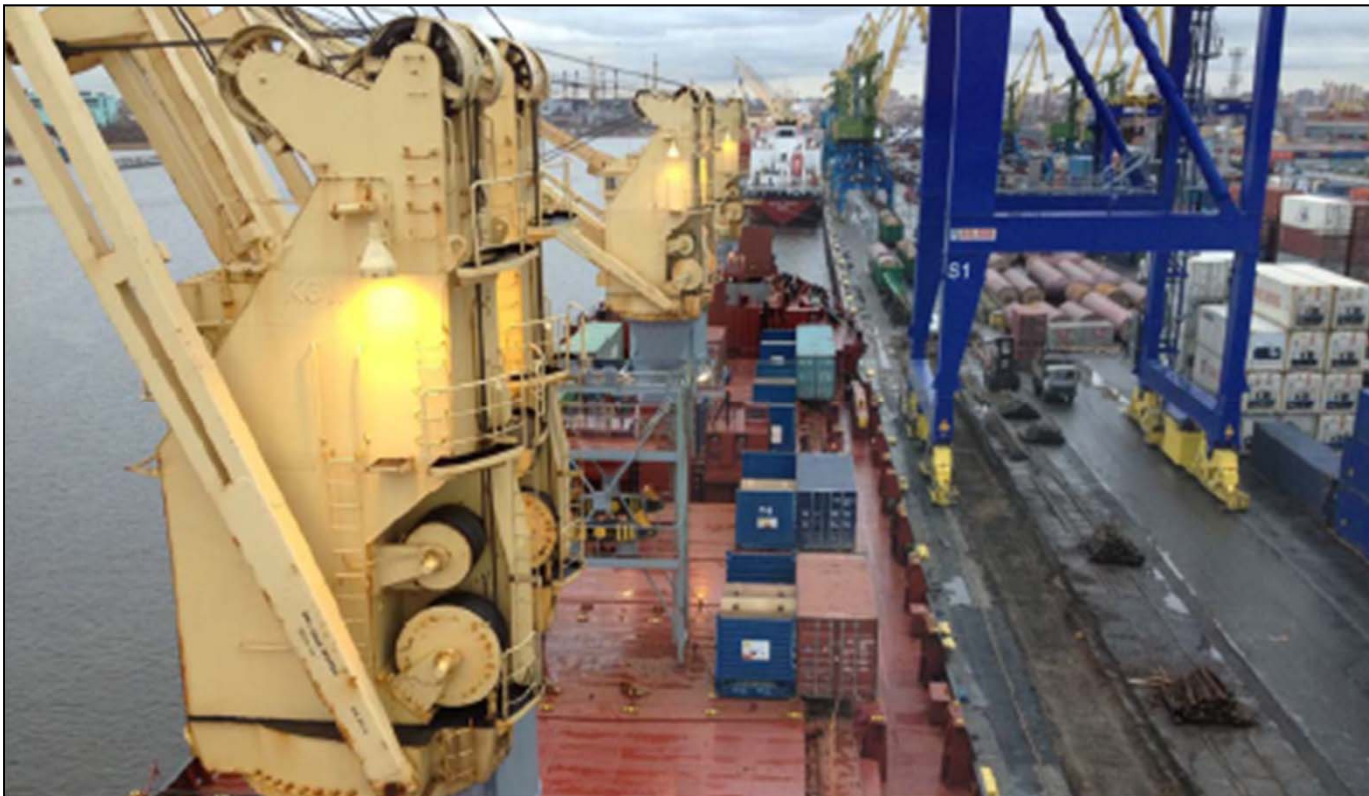


- The Blend Down Monitoring System (BDMS) performed continuous, unattended HEU flow and enrichment measurements
- BDMS was installed at all three Russian blending facilities



Results after 20 years

- Russia completed HEU downblending and LEU deliveries in 2013
- 500 MT HEU (20,000 nuclear warhead equivalents) converted into LEU
- One of the world's most successful nuclear threat reduction programs



Role of U.S. Industry

- Unique government-industry partnership to achieve the U.S. Government's nuclear nonproliferation and arms-control goals
- 101 reactors in 31 states have received WR fuel under the Agreement





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